Title: Influence of gyres on the transport of pre-settlement stages into Florida Bay
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Themes: (2) Fisheries Dynamics and (3) Regional Coastal Ecosystem Processes
Goal: Understanding the role of coastal, mesoscale eddy processes in transporting marine species from their spawning grounds to the juvenile nursery in Florida Bay.

When marine populations have spawning and juvenile habitats that are spatially far apart, linkage is important to ensure sustainability. In South Florida, keystone species such as snappers, spiny lobster, and pink shrimp use the shallow, estuarine Florida Bay for juvenile nursery, yet a principal spawning ground lies in the Dry Tortugas Ecological Reserve some 150 km upstream of the Bay. What are the pathways and processes that link the locations, and how will natural and anthropogenic disturbances impact the connectivity?

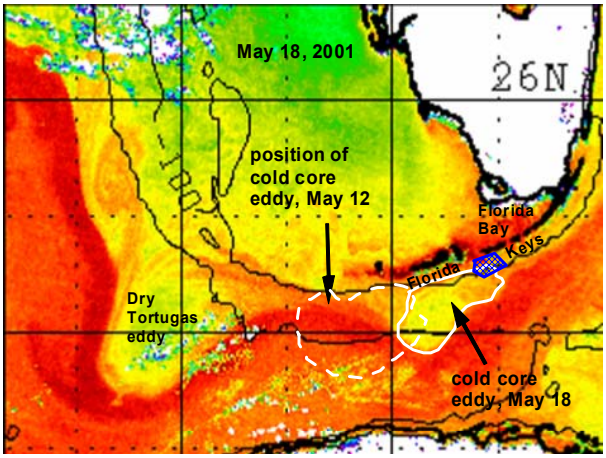

Fig. 1. Satellite sea surface temperature imagery (May 18, 2001) depicting the progress of an eddy the Dry Tortugas towards the Florida Keys. Dashed white boundary delineates the eddy's position off the lower Keys on May 12. By May 18, the eddy (solid white boundary) has progressed to the middle Keys. An eddy's cold core appears as green, contrasting with surrounding warmer waters in red. Blue gridded polygon depicts OSCR domain (magnified in Fig. 2).

On the average, a mesoscale eddy propagates downstream from the Dry Tortugas towards the Florida Keys every 1-3 months. The eddy shrinks as it progresses towards the middle Keys and finally disintegrates before reaching the upper Keys. This mechanism can potentially entrain young stages of marine species spawned in the Dry Tortugas and transport them to Florida Keys. The breakup of the eddy would release them inshore near the channels into Florida Bay.

We followed the evolution of the eddies using satellite sea surface temperature and sea surface height imagery (Fig. 1), and compared the densities of young fishes, shrimps, and lobsters entering Florida Bay through the inter-island channels along the Florida Keys during the presence and absence of an eddy directly offshore. A shore-based Ocean Surface Current Radar (OSCR) system was set up to capture the real-time surface flow structure of the eddy as it passes through the OSCR domain (Fig. 2). At the same time, nets are moored at the channels to sample the influx of young stages. The time series of OSCR surface current vectors during the eddy event is used

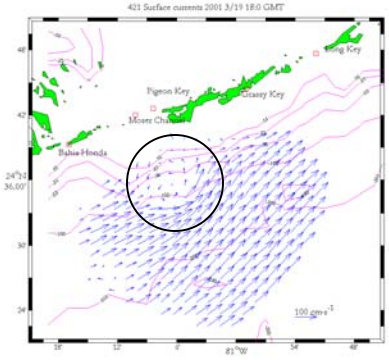

Fig. 2. OSCR mapped surface current vectors off a middle Keys channel captured a sub-mesoscale eddy (circled).

to correlate with catches and to model particles trajectories in the OSCR domain. We expect to find high influx of early life stages through the channels, as the first confirmation of the ecological importance of these eddies to the replenishment of marine populations in the South Florida ecosystem.